The Effects of Immigration on the Housing Market: Canada

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Abstract

This paper investigates the relationship between immigration and house prices in Canada using econometric methods. The study employs a panel data set covering Canadian provinces over the period 2005-2021 and uses a two-way fixed effects model to estimate the impact of immigration on house prices while controlling for other factors that may affect housing markets. The results show that immigration, on average, has no significant effect on housing prices. However, it can have negative effects in certain cases. The study also finds that the correlation between immigration and house prices varies across different regions in Canada. These findings have important implications for policymakers and stakeholders in the housing market, particularly in understanding the potential impact, or lack thereof, of immigration policies on housing affordability.

Keywords: Immigration; Housing; House prices; Newcomers; Immigrants.

1. Introduction

Canada received an average of 260,000 immigrants each year between 2002 and 2021, with strong variation between the years (Statistics Canada - A). Immigration spiked in 2017 but fell sharply in 2020/2021 due to pandemic-induced global travel restrictions. The Canadian economy experienced multiple business cycles in the same period, along with two big recessions in 2008 and 2020. Although the housing market experienced some volatility, it did

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not suffer serious effects during the recession. The fast-growing New Housing prices only experienced a moderate slowdown in 2008 and 2020 before resuming a growth path.

In November 2022, the Federal Government of Canada announced a new Immigration plan that would see Canada welcome over 500,000 immigrants each year by 2025 (CBC, 2023). Consequently, concerns were raised in the media over the effects of this policy. The timing is also of interest since the housing market has been feeling the squeeze of high interest rates, tight labour markets, and rising oil and commodity prices. Housing prices soared in 2022, causing concerns over affordability and the market's stability, which have only been made worse by the higher interest rates. The economic environment is ripe for a conversation about immigration and housing.

Previous research on this topic has shown that the effects of immigration on housing prices in Canada are, at best, mild and occur over a longer time horizon (Haider & Moraines, 2019). Akbari & Aydede (2013) estimated the effects of immigration on house prices using census data between 1996 and 2006. They found that the maximum increase in house prices caused by immigration is in the range of 0.10-0.12%, and this is caused by immigrants arriving over ten years before the effect. In the short term, immigrants have positive effects on local economies.

This makes this issue important to study since the effects of immigration on housing prices are not clearly discernible but are of great concern in the socio-economic discourse in Canada. This paper aims to estimate the effects of Immigration on the New Housing Price Index and the CREA Housing Price Index in Canada. The paper uses annual province-level data on the inflow of immigrants and the New Housing Price Index (NHPI) which are respectively estimated and developed by Statistics Canada. Additionally, a second Home Price Index developed by the Canadian Real Estate Association is also used separately. A linear OLS model is used first, combined with two-way fixed effects and other time and province-variant controls. A shift-share Instrument is created to make a causal inference for the impact of immigration on housing prices.

2. Literature review

The methodology of this paper follows the methods used by Sanchis-Guarner (2023). The paper estimated that immigration in Spain, between 2001 and 2012, had a positive effect on housing prices; a 1% increase in immigration rates caused a 3.3% increase in prices. The paper used multiple regressions to isolate the partial effect of immigration on housing prices and rents. Immigration has an induced effect on local migration patterns of native-born people in these areas, which in turn also affects house prices. The models estimated the effect of total population changes (immigration + native migration) on housing prices and the induced effects of immigration on the changes in the native-born stock population stock. Combining these two models allows us to derive the total effect of immigration on housing prices directly and through the induced effects on native-born population movements. In this paper, an instrument similar to the shift-share instrument used by Sanchis-Guarner (2023) is constructed to make a causal inference. However, the effects will not be decomposed into the partial and induced effects on housing prices.

Akbari & Aydede (2013) focus their research on Canada and use census data published at 5-year intervals to estimate the impacts of immigrant populations on housing prices in both the short and long run. They also take a more in-depth approach by using Census Divisions as the units of study, to capture the more direct impacts of immigration on Local Markets. They find that immigration only has a mild long-term effect on housing prices. Immigrants affect house prices over a 10-year horizon by approximately 0.10%-0.12%. The interpretation is that immigration does not immediately increase the demand for housing purchases but rather in the short term, would increase the demand in the rental markets.

3. Housing market

The economic theory applied in this paper is a simple decomposition of the housing market. The supply of housing is extremely inelastic, with the production of new units being time and resource intensive, sensitive to macroeconomic factors, and reliant on the availability of land. The average time to build new houses is approximately seven months, with the time increasing to over 14 months for owner-built custom housing (Heidenry, 2022), and several years for larger apartment complexes (Schuetz, 2018). The housing supply is relatively fixed and grows at a marginal rate each year. Long-term changes in housing supply are associated with changes in demand or government policies.

Housing demand is created by a combination of factors such as an increase in income, an increase in population, urbanization, migration, etc. The factors affecting demand often interact with each other. Higher incomes increase the demand for housing due to greater spending power, particularly newer housing. However, higher incomes in a region also attract migrants from within and outside the Country, adding to the demand effect. The inflow of migrants can subsequently affect the local economies, inducing changes in local populations and labour markets and causing an increase or decrease in the demand for housing. Additionally, the inflow of migrants (both native and foreign) could more adversely affect demand in the rental market, since house ownership requires a certain level of wealth accumulation, and the demand is not continuous in income.

Housing demand is also incredibly sensitive to changes in Interest rates since both the construction process and final purchase of housing often use debt instruments. The COVID-19 Pandemic caused a temporary decrease in purchasing power and migration, causing a short-term fall in demand. The recovery process, however, saw a massive increase in immigration, combined with an increase in consumer spending of pent-up savings, both of which caused the housing demand to surge. The inelasticity of supply caused the changes in demand to be largely reflected in the changes in prices, and housing prices grew rapidly after 2020.

The following assumptions can be made for this paper:

1. Changes in Macroeconomic factors are constant across provinces (e.g., Interest rates).
2. Housing construction and investment levels differ between provinces, but these differences do not change over several years.

We can then use our two-way fixed effects model to estimate the partial effects of the increase in demand due to immigration after controlling for changes in labour markets, income, and housing supply and using a suitable instrument.

4. **Dataset description**

The dataset used is an Author-compiled panel dataset covering 10 Canadian provinces over 18 years (2005-2021). Most variables are sourced from Statistics Canada tables and surveys.

The variables being used to capture housing prices are the New Housing Price Index (NHPI), published by Statistics Canada, and the CREA Home Price Index (HPI), published by the Canadian Real Estate Association. The NHPI series captures the market prices of newly constructed houses. Statistics Canada transforms data from the New Housing Price Report survey, by using appropriate weights, into a monthly index. The CREA HPI captures the value that home buyers assign to various housing attributes to construct a local price index for geographical regions, which is a good estimate of housing demand. Other measures of housing prices, such as those published by Teranet, can also be used.

The explanatory variable of interest is the Immigration Rate for each province. This is calculated by dividing the estimated annual inflow of immigrants by the estimated population for each province in each year (Statistics Canada - A). The data series capturing the flow of migration consists only of estimates published by Statistics Canada since actual data on migration cannot be tracked accurately nor collected frequently. Several lags of the immigration rate are added to the model to capture the effects of immigration over a longer time horizon.

As observed in Figure 1, the immigration rate varies significantly across provinces, both in levels and in variance. Newfoundland, New Brunswick, and Nova Scotia have consistently low immigration rates and levels. Ontario, Alberta, and British Columbia have high rates of immigration and higher levels of immigration, with Ontario absorbing over 50% of new immigrants arriving in Canada each year. Prince Edward Island and Saskatchewan have large variations in immigration rates over time which make the models more difficult to predict. Due to this large variation in immigration rates over time, it would be possible to conduct a Diff-in-diff study to estimate the effects of a single large change in the immigration rate on housing prices.

Several controls are included in the dataset but not used in the model. An important control variable being used is Net Inter-Provincial Migration and its lagged values. The population density over time for each province is also added as a control variable. Using a two-way fixed effects model eliminates the need to use additional time and/or state-invariant control variables.

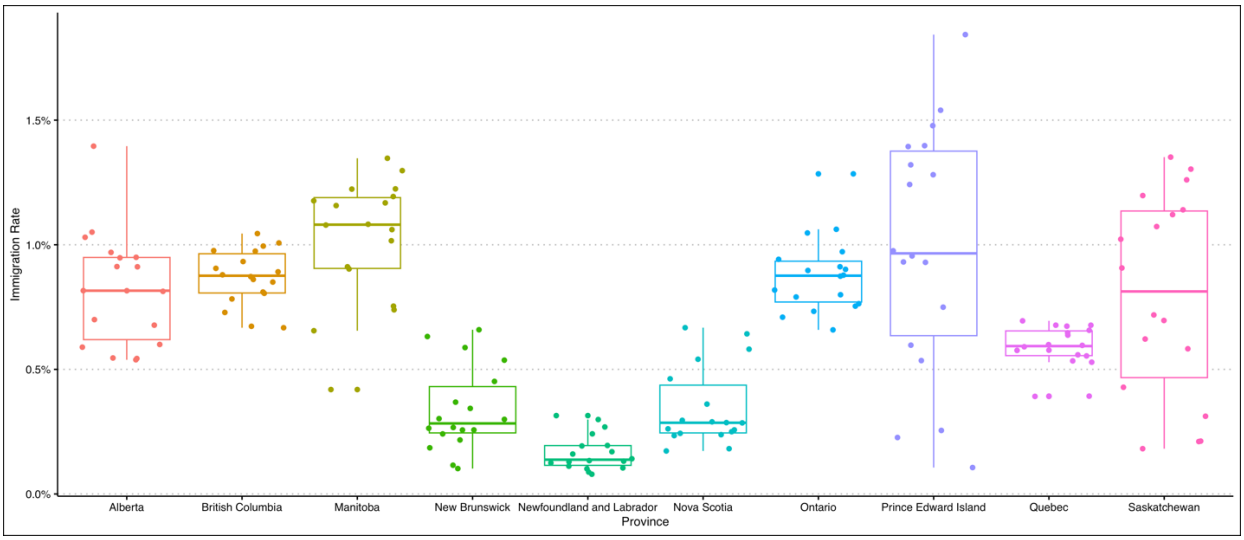

FIGURE 1 Variation in immigration rates

NOTES: The boxplots in the figure capture the standard deviation of immigration rates over time, capturing the variation and the heterogeneity of variation observed in immigration rates.

Control Variables relevant to housing supply have been included in the model, including housing starts, completions, and stock. The housing stock was measured in the 2021 Census, and the variable used in this paper has been calculated by subtracting the housing competition from the stock of housing in the next period.

$$(Housing\ Stock)_t = (Housing\ Stock)_{2021} - \sum (Housing\ Completions)_{t+1} \quad (1)$$

Error in these calculations arises from the creation of new houses in place of older houses, causing estimates of housing stocks to be lower than actual values. However, assuming that a constant share of new houses completed each year are built to replace older housing, the variation in housing stock estimates is still relevant to the models. Additionally, the share of employment in the construction sector is also added for each province year.

Additional controls are added for labour market conditions in each province which might not be captured in the state and time fixed effects. Labour market conditions such as the unemployment rate and average wage are likely to attract more immigrants but also cause higher housing demand and higher prices as a result.

5. Two-way fixed effects model

The estimated base case models are:

$$\Delta log(NHPI)_{i,t} = \beta_1 (ImmigRate)_{i,t} + \sum[\beta_k . (ImmigRate)_{i,t-k}] + \alpha_i + \gamma_t + \theta_{i,t} + \varepsilon_{i,t} \quad (2)$$

$$\Delta log(CREA\ HPI)_{i,t} = \beta_1(ImmigRate)_{i,t} + \sum[\beta_k.(ImmigRate)_{i,t-k}] + \alpha_i + \gamma_t + \theta_{i,t} + \varepsilon_{i,t} \quad (3)$$

The dependent variable being used is the annual growth rate (log difference) of the New Housing Price Index. $\beta_1$captures the partial correlation between immigration and the growth rate of housing prices. $\beta_1$values capture the percentage change in the House Price Index for every 1 percent change in the immigration rate. $\alpha_i + \gamma_t$ capture the state and time fixed-effects, and $\theta_{i,t}$ captures the effects of the state and time-variant control variables. $\varepsilon_{i,t}$ is the error term in the regression.

A two-way fixed effects regression can help eliminate a large source of omitted variable bias by accounting for state and/or time-invariant factors. Since the models use log differences and growth rates for most variables, a large source of unobserved level-associated effects between provinces can also be eliminated. However, several unobserved state and/or time-variant variables can induce bias in the estimators, even after introducing controls.

Additional models estimated (Isolating effects in different provinces):

1. Differences in effects between provinces

$$\Delta log(NHPI)_{i,t} = \sum[\beta_{1i}(ImmigRate * Province\ Dummies)_{i,t}] + Previous\ Controls\ + \varepsilon_{i,t} \quad (4)$$

$$\Delta log(CREA\ HPI)_{i,t} = \sum[\beta_{1i}(ImmigRate * Province\ Dummies)_{i,t}] + Previous\ Controls + \varepsilon_{i,t} \quad (5)$$

2. Differences in effects between provinces with Low and High immigration levels

$$\Delta log(NHPI)_{i,t} = \sum[\beta_{1i}(ImmigRate * Low\ Immigration)_{i,t}] + Previous\ Controls\ + \varepsilon_{i,t} \quad (6)$$

$$\Delta log(CREA\ HPI)_{i,t} = \sum[\beta_{1i}(ImmigRate * Low\ Immigration)_{i,t}] + Previous\ Controls + \varepsilon_{i,t} \quad (7)$$

5.1 Results

A two-way fixed effects model estimates the correlation between immigration rates and housing prices.

The base models show a significant negative correlation between immigration rates and housing and new housing prices, as observed in Table 1. This could represent an endogenous selection of immigrants' province of destination, as low housing prices may signify cheaper costs of living and the presence of economic opportunities. As immigration rates increase in a certain province, the housing prices in the same year can experience a downturn, capturing the immediate negative correlation between the variables.

TABLE 1
Two-way fixed effects regression results

	Coefficients (Significant at 95% level)			
	Base Model		Immigration Level Effects	
Variable	**NHPI**	**CREA HPI**	**NHPI**	**CREA HPI**
Immigration Rate (t)	-2.0136	-1.6878	-	-
Immigration Rate (t-1)	-	-	-	-
Immigration Rate (t-2)	-	1.0253	-	-
Immigration Rate (t-3)	-	-	-	1.0152
Inter-Provincial Migration Rate (t)	-	5.1088	-	5.1059
Inter-Provincial Migration Rate (t-1)	-	-	-	-
Inter-Provincial Migration Rate (t-2)	-2.8484	-2.463	-2.8424	-2.4707
Unemployment Rate	-	-	-	-
Housing Starts	1.07E-06	1.24E-06	1.10E-06	1.26E-06
Share of Employment in Construction	-	-0.6233	-	-0.62825
Average Wage	-	-	-	-
Low- Immigration Provinces	-	-	-2.1257	-1.7854
High-Immigration Provinces	-	-	-	-
Clustered Standard Errors	**Yes**	**Yes**	**Yes**	**Yes**
Adjusted R-Squared	**0.47348**	**0.50037**	**0.4708**	**0.49663**

However, a 1 % increase in the immigration rate correlates with a nearly 1% increase in housing prices two years ahead. The lagged effect can be explained by the process of wealth accumulation that occurs in the initial years, building up to the purchase of houses by immigrants a few years after landing.

Additionally, Inter-provincial migration negatively correlates with housing and new housing prices two years into the future but has a short-term positive correlation with CREA prices.

Interestingly, when comparing the effects between provinces with high and low levels of immigration, we see notable differences. Housing prices and new housing prices in provinces with lower levels of immigration have a strong negative correlation with the immigration rate.

Low Adjusted R-squared values suggest that the used predictors do not sufficiently capture the variation in house prices and that the estimators are likely to be biased due to omitted variables.

6. Endogeneity

Since immigration in Canada is largely economic growth-oriented, immigrants are likely to settle in provinces with better economic prospects. This is a source of endogeneity that is important to address since it represents a selection bias and the presence of confounders.

The immigration rate in each province is motivated by broader economic conditions, labour market conditions in particular. The two largest sources of immigration in Canada are economic immigrants and students. For economic immigration, job prospects are the most important determining factor. Immigrants choose cities/provinces where they can easily secure a job that also pays sufficiently to cover the costs associated with immigration. However, strong labour markets are also linked with higher housing prices as discussed above.

Students are likely to consider both labour markets and the quality of post-secondary educational institutes while choosing the province of initial settlement. Due to the public funding of education in Canada, more and better post-secondary educational institutes are located in provinces with higher incomes, economic activity, and consequently government funding. There is also a clustering effect of educational institutions around localized industries that demand college/university-educated labour, which leads to endogenous allocations of post-secondary institutions across provinces and endogenous immigration patterns among students. Hence, there are confounding economic variables that cannot be controlled for and introduce endogeneity in the model.

Lastly, the two-way fixed effects model assumes that macroeconomic factors affect provinces similarly and get captured by the time-fixed effects component of the model. However, macroeconomic changes can affect provinces separately, based on the unique characteristics of each province. For example, oil price shocks may have a net negative economic effect in most provinces but lead to economic growth and surplus in Alberta and Saskatchewan which have a significant oil and gas industry. Similarly, trade restrictions may only affect certain provinces with relevant industries of export, while leaving other provinces completely unaffected. Over the time horizon for this study, several notable macroeconomic events may have had varying effects across the provinces, creating further problems of endogeneity in the model.

7. Shift-share IV

A shift-share instrument is constructed in place of the immigration rate to deal with endogeneity and make causal inferences. The instrument is similar to the shift-share instrument adopted by Sanchis-Guarner (2023). The shift-share instrument uses historical patterns of immigration to model the distribution of immigrants across provinces. The variable we want to instrument is:

$$(ImmiGrate)_{i,t} = \frac{Flow\ of\ Immigrants_{i,t}}{Population_{i,t-1}}$$

The shift-share instrument constructs a distribution of immigrants and populations using the following two equations:

$$\boldsymbol{SS\ Flow\ of\ Immigrants_{i,t} = Flow\ of\ Immigrants_{Canada,t} \times \frac{Stock\ of\ Immigrants_{i,1990-2000}}{Stock\ of\ Immigrants_{Canada,1990-2000}}} \quad (8)$$

$$\boldsymbol{SS\ Population_{i,t-1} = Population_{Canada,t-1} \times \frac{Population_{i,1996}}{Population_{Canada,1996}}} \quad (9)$$

The instrument:

$$(Shift\ Share\ Instrument)_{i,t} = \frac{SS\ Flow\ of\ Immigrants_{i,t}}{SS\ Population_{i,t-1}} \quad (10)$$

Equation 10 uses the pattern of immigrant settlements in the base year to predict the flow of immigration to each province. The theory used for this instrument is the gravity principle that captures the community effects on immigrant allocation. The model assumes that immigrants are more likely to settle in provinces with an already large, settled immigrant community. The total immigrant flow into Canada each year is then weighted by the shares of immigrant stocks in the base year to predict the number of new immigrants that settled in each province in that year.

The instrument uses the share of foreign-born stock of the population in 2021 that immigrated to Canada between 1990 and 2000. Due to a lack of data availability, the base year patterns have been extrapolated from the 2021 census counts. Using the total share of foreign-born stock of the population in 2021 also gives similar results when tested.

A similar approach is used to calculate the population in each province, using historical patterns of population settlements.

Testing the instrument shows that there is no significant correlation between the instrument and the immigration rate in a given year. However, the instrument has some significant correlation with immigration rates in the following year.

The correlation between the constructed instrument and the immigration rate (in t+1) is statistically significant and meets the conditions of validity since it is exogenous to housing prices and only affects them through predicted immigration rates. The use of historical shares removes any effect of current economic factors on the instrument, including the effects of housing prices.

However, the shift-share instrument is weak and does not accurately capture the variation in immigration rates within provinces. A linear model without provincial fixed effects captures a strong and significant positive relationship between the instrument and immigration rates. This captures the province-level differences in immigration rates correlating with province-level differences in instrument values. However, the immigration rates within provinces vary a lot over time, and this within-province variation is not captured well by the instrument. Figure 2 shows the strong positive correlation between the immigration rate and the instrument when not controlling for the level differences between provinces (black line). However, within each province (coloured lines), the random variation of immigration is not

captured well by the instrument. The dispersion on the x-axis, capturing the variation in immigration rates, is not captured sufficiently by the corresponding instrument values which are dispersed on the y-axis.

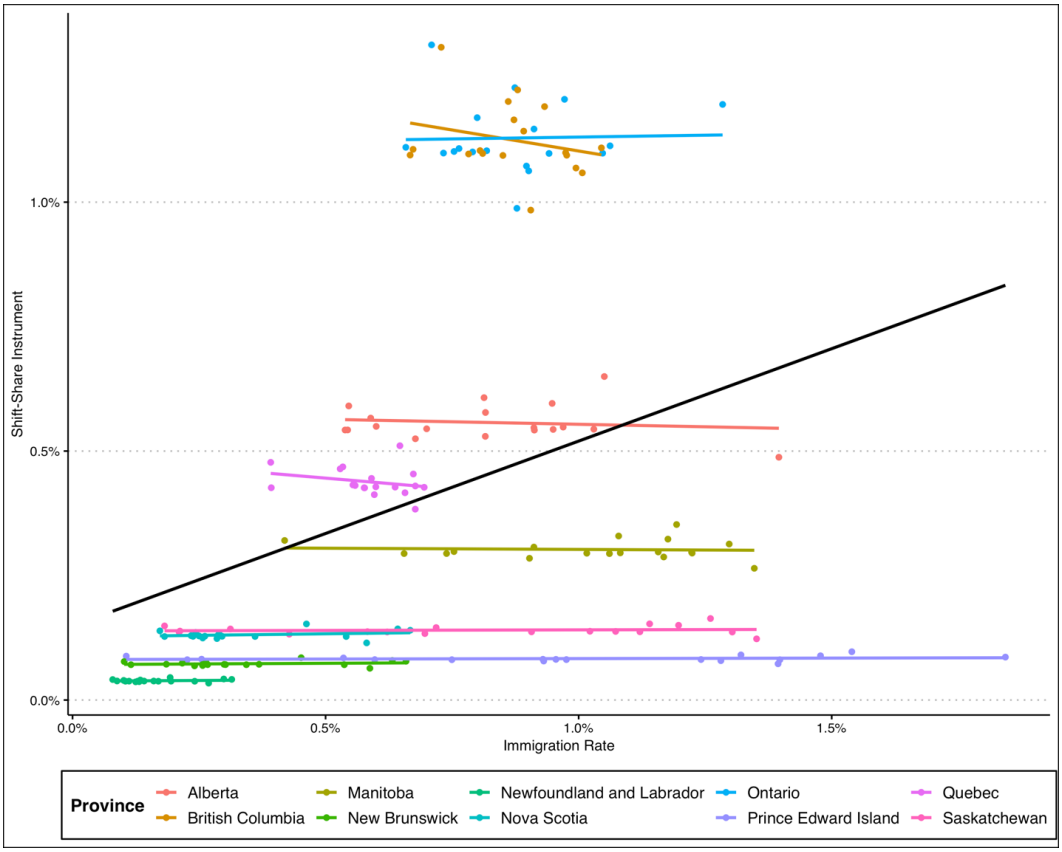

FIGURE 2 Shift-share instrument strength

NOTES: The black line captures the linear correlation between the instrument and the immigration rates across all provinces. The coloured lines capture the same correlation for each province.

This inefficiency is due to the use of historical shares of immigrants on an aggregate level, which does not capture the variation in settlement patterns between immigrants of different nationalities/ethnicities, changes in immigration policies, or the change in labour market conditions across provinces. Importantly, it does not capture the potential for the formation of newer immigrant communities that affect the distribution of new immigrants.

This instrument is a much simpler version of the Sanchis-Guarner shift-share instrument, and it does not capture the detailed patterns of community settlement by nationality and ethnicity. Using nationality as a grouping variable while calculating the “shares'' of foreign-born stocks in the base year and predicting the flow of immigrants each year by the number of immigrants from each national/ethnic group, would capture more of the variation in the immigration rates and create a stronger instrument. While this instrument is used to obtain some results in this paper, the results should not be interpreted as causal. Instead, using this instrument can still be beneficial in guiding future research on this topic, guiding the search for stronger instruments, and serving as a metric of comparison.

7.1 Results

Using the shift-share instrument to make causal predictions, the base model is estimated with relevant controls. As seen in Table 2, changes in immigration rates had no predicted effect on the Home Price Index but caused a decrease in the New Housing Price Index. A 1% increase in the immigration rate predicts a causal decrease of 3% in new housing prices. This inference is conditional on the validity of the instrument and a stronger instrument is required, using more data, to capture the true causal relationships. Additionally, the estimates are likely to be biased due to potential omitted variables.

TABLE 2
Two-stage least squares regression results

	Coefficients (Significant at 95% level)	
	Base Model	
Variable	**NHPI**	**CREA HPI**
Immigration Rate (t)	-3.0576	-
Immigration Rate (t-1)	-	-
Immigration Rate (t-2)	-	-
Immigration Rate (t-3)	-	1.801
Inter-Provincial Migration Rate (t)	-	4.9721
Inter-Provincial Migration Rate (t-1)	-	-
Inter-Provincial Migration Rate (t-2)	-2.8424	-
GDP Per Capita	-	-
Housing Starts	1.03E-06	2.12E-06
Share of Employment in Construction	-	-0.58587
Average Wage	-0.0061016	-0.011739
Low- Immigration Provinces	-	-
High-Immigration Provinces	-	-
Clustered Standard Errors	**Yes**	**Yes**
Adjusted R-squared	**0.46798**	**0.35785**

A 1% increase in immigration also results in a 1.8% increase in the CREA house price index after 3 years. The lagged effect could signify wealth accumulation over time resulting in housing purchases, while the short-term increase in demand may be reflected in the housing rental market. The effects in this case are also similar for provinces with both low and high levels of immigration, and there is no significant effect of immigration levels captured by the model.

8. Tests

8.1 Testing for heteroskedasticity

Models using the New Housing Price Index have Heteroskedastic Error Terms. To test the coefficients, heteroskedasticity robust standard errors are used. Additionally, using the two-way fixed effects models introduces heteroskedasticity due to differences between provinces.

8.2 Testing for autocorrelation

The data has strong autocorrelation due to the time series components of each variable. Using the log differences and growth rates of some variables removes non-stationarity from them. However, there is still some autocorrelation in variables within each province, and clustered standard errors are used for hypothesis testing in the models.

9. Conclusion

Canada's approach to immigration is unique, and the effects of immigration on the economy are complex. The models in this paper show either no correlation between immigration and housing prices, or a negative correlation in the short term. This indicates that there is a possible absorption of immigrants into the housing markets of regions with high levels of immigrant settlements. Another possible explanation could be found when looking at the effect of immigration on the demand in the rental markets separately since the rental markets and house purchase markets often compete for consumers.

Immigration rates between provinces varied differently over time, which can indicate that several unobserved factors changed between provinces. These factors would not be captured by the fixed effects component of the model and would need to be further studied and controlled for in the study. Immigration across all provinces spiked in 2016/2017 and fell in 2021, while the rate varied across different periods of time. The effects of several immigration-related policies can be estimated by modelling around these periods.

The models and instruments constructed in this paper are not sufficient to make inferences about the effects of immigration on housing prices. Additionally, the low Adjusted R-squared values indicate that the predictors used do not sufficiently explain the variation in house prices over time and across provinces. The approach can be adjusted in several ways.

Using more explanatory variables can improve model efficiency by capturing the effects of unobserved factors. Provincial policies to incentivize/disincentivize immigration may play a large role in explaining the variation in immigration rates, as labour shortages in provinces lead to prolonged periods of policy adjustments to induce in-migration.

Immigration induces inter-provincial migration due to structural changes to labour supply that are dispersed unequally between provinces. These induced flows of inter-provincial migration may signify an increased mobility of the native population, leading to an eventual

equilibrium in provincial labour markets spurred by immigration. The effects of such induced inter-provincial migration may not be captured in this model. Creating an additional instrument to capture the causal effects of immigration in inter-provincial migration would allow for the complete effects of migration on housing prices to be captured.

A different type of study using a diff-in-diff method can be conducted, using census data collected every 5 years, or using a panel dataset consisting of demographic estimates every year. This study could use data at the city/sub-local levels and isolate the impacts of immigration on sub-local housing markets. Such a study would be more precise since it eliminates the noise in province-level data generated by variations in migration settlements and housing prices within provinces. Immigration across all provinces spiked in 2016/2017 and fell in 2021, while the rate varied across different periods of time. The effects of several immigration-related policies can be estimated by modelling around these periods.

A stronger instrument can be constructed with further data on migrant characteristics using the shift-share approach. Using migration data that can categorize migrant nationality or ethnicity can make the shift-share approach more efficient, capturing the gravity effect of immigrant social networks on the patterns of immigration over time. Conversely, other novel instruments can also be used. Google Trends results for the most popular educational institutes in each province were also considered as a viable instrument. However, due to the lack of available modifications to the data, the trends primarily consisted of Google searches from within Canada. Using isolated trends results of online interest in the provinces' key attributes could help construct an exogenous instrument to predict immigration rates, which is arguably uncorrelated with the error term.

Lastly, the study can be conducted with more specific data on the housing markets and immigrant characteristics, using data at a quarterly frequency.

The complex patterns of immigration over time have led to both short-term and long-term changes in local economies, and the true effects of immigration on the housing market, in particular, are difficult to estimate. However, further investigation into these effects is of the essence as Canada, among other advanced economies, turns to immigration as a solution for ageing populations and declining birth rates.

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